REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is respectfully requested.

Overview of the Claimed Invention:

An integrated circuit has at least one metal layer that includes conductors to provide interconnectivity for the integrated circuit chip. For purposes of assigning preferred wiring directions for the conductors, the metal layer is divided into at least two sections. A section is a contiguous area of the IC that contains at least one thousand wires. Each section has a preferred wiring direction. The preferred direction, within a section, defines a direction, relative to a boundary of the integrated circuit, for at least fifty percent of conductors in the section. For example, if the preferred direction is a horizontal direction, then at least fifty percent of the conductors in that section are oriented horizontally relative to the boundaries of the integrated circuit chip. To more efficiently utilize the space on the metal layer, a first section has a preferred direction for the conductors contained in the first section. A second section, on the same metal layer as the first section, has a diagonal preferred wiring direction for the conductors in its section.

Wires in a section may be deposed in a direction other than the preferred direction. A wire deposed in a Manhattan direction in a section that has a preferred

diagonal direction is referred to herein as a "zag." In one embodiment, a section may comprise a diagonal preferred wiring direction, and the section may have at least one conductor deposed in a Manhattan direction coupled to a conductor deposed in the preferred diagonal wiring direction. A section may also contain zigs. A wire deposed in a diagonal direction in a section that has a preferred Manhattan direction is referred to herein as a "zig." For example, a section may comprise a Manhattan preferred wiring direction, and the section may have at least one conductor deposed in a diagonal wiring direction coupled to a conductor deposed in the Manhattan wiring direction. Figure 10 of the subject patent application discloses sections of a wiring layer with both zig and zag configurations.

Rejection of the Claims Under 35 U.S.C. § 102 and § 103

In the Office Action dated January 3, 2002, claims 1, 10-12 and 14-16 were rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent 5,541,005, issued to Bezama et al. (hereafter referred to as "*Bezama et al*"). Also, claims 1-9, 11 and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent 5,635,736, issued to Funaki et al. (hereafter referred to as "*Funaki et al.*").

Overview of Cited References:

Bezama et al discloses a ceramic greensheet article. Segments of a greensheet article are combined to form a larger green sheet. A metal wiring pattern is formed on at least one of the greensheet segments. Figure 1 of *Bezama et al* shows wiring patterns on

segments of the combined greensheet. The wiring patterns include wires deposed in an X direction (segments 12 and 16) as well as the Y direction (segments 14 and 18).

Funaki et al. disclose wiring for a MOS gate type semiconductor device. Figure 1 shows a two-layer structure SD wiring pattern. The length wise direction of the drain electrode is oblique to the axis at 45 degrees. A drain electrode is symmetrical to another drain electrode with respect to a line in the y axis direction formed at a position apart from that drain electrode in the x-axis. Thus, the drain electrodes constitute a "V" pattern separated at its center into two halves.

A. The References Do Not Disclose A Manhattan Directional Wire Coupled To A Diagonal Directional Wire In A Section With Diagonal Wires As The Preferred Direction.

Claim1 includes the features:

at least one metal layer comprising a plurality of sections, each section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit,

and

a second section comprising a preferred diagonal wiring direction for the conductors deposed in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section

further comprising at least one conductor deposed in a Manhattan direction coupled to a conductor deposed in said preferred diagonal wiring direction.

Accordingly, Applicants claim, in amended claim 1, a plurality of sections in a metal layer, wherein the second section, in addition to having wires deposed in the preferred diagonal wiring direction, includes "at least one conductor deposed in a Manhattan direction coupled to a conductor deposed in said preferred diagonal wiring direction." Applicants respectfully contend that the references do not disclose, either alone or in combination, a plurality of sections in a metal layer that includes a first section with a preferred directional wiring, a second section with wires deposed in the preferred diagonal wiring direction, different than the preferred direction of the first section and including at least one conductor deposed in a Manhattan direction coupled to a conductor deposed in said preferred diagonal wiring direction.

Bezama et al. disclose, in Figure 1, a plurality of sections, wherein each section has a wiring direction. *Bezama et al.* do not disclose wires deposed in different directions within the same section. Thus, *Bezama et al.* do not suggest or teach toward a wiring architecture with a conductor deposed in a diagonal direction coupled to a conductor deposed in a Manhattan direction. Similarly, *Funaki et al* do not disclose a wiring architecture with a conductor deposed in a diagonal direction coupled to a conductor deposed in a Manhattan direction. As such, *Bezama et al.* and *Funaki et al* do not anticipate claim 1.

B. The References Do Not Disclose A Diagonal Directional Wire Coupled To A Manhattan Directional Wire In A Section With Manhattan Wires As The Preferred Direction.

Claim 17 includes the fetaures:

at least one metal layer comprising a plurality of sections, each section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit,

and

a first section comprising a Manhattan wiring direction for the conductors deposed in the first section, the first section further comprising at least one conductor deposed in a diagonal direction coupled to a conductor deposed in the Manhattan wiring direction.

Applicants claim, in new claim 17, a plurality of sections in a metal layer, wherein the first section has wires deposed in a Manhattan wiring direction and includes "at least one conductor deposed in a diagonal direction coupled to a conductor deposed in the Manhattan wiring direction." Applicants respectfully contend that the references do not disclose, either alone or in combination, a plurality of sections in a metal layer that includes a first section with wires deposed in a Manhattan wiring direction, including at least one conductor deposed in a diagonal wiring direction coupled to a conductor deposed in the preferred Manhattan wiring direction.

As discussed above in conjunction with claim 1, *Bezama et al.* do not disclose wires deposed in different directions within the same section, and therefore *Bezama et al.* do not suggest or teach toward a wiring architecture with a conductor deposed in a preferred Manhattan direction coupled to a conductor deposed in a diagonal direction. Also, *Funaki et al* do not disclose a wiring architecture with a conductor deposed in a preferred Manhattan direction coupled to a conductor deposed in a diagonal direction. Accordingly, *Bezama et al.* and *Funaki et al* do not anticipate new claim 17.

C. The Use Of Zigs And Zags In A Section Of A Wiring Layer Provides More Efficient Wiring.

The claimed invention provides for an efficient wiring architecture. Typically, wires are deposed in a single direction on a wiring layer in an integrated circuit. The claimed invention divides a single wiring level in at least two sections. A preferred wiring direction is selected for each section. In addition to the conductors deposed in the preferred direction, at least one conductor, situated in a direction different than the preferred direction, is coupled to a conductor situated in the preferred direction.

Although it is advantageous to situate conductors of a section or layer in a uniform direction, the claim invention attains additional routing efficiencies by providing conductors in directions other than the preferred direction of a layer or section.

Specifically, the claimed invention increases the efficiency of a wiring layer by 1) including multiple sections with different preferred directions on a single wire layer and by 2) including at least one conductor, deposed in a different direction than the preferred wiring direction, coupled to a conductor deposed in the preferred wiring direction. The efficiencies achieved by this wiring architecture are not taught in the cited references.

Dependent Claims:

Dependent claims 2-16 are depend, either directly or indirectly, upon independent claim 1, and therefore for the same reasons claim 1 is patentable over the cited references, claims 2-16 are also patentable over the cited references.

CONCLUSION

In view of the foregoing, it is submitted that the claims are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

Respectfully submitted,

STATTLER JOHANSEN & ADELI LLP

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John Stattler
Reg. No. 36,285

Stattler, Johansen & Adeli LLP
PO Box 51860
Palo Alto, CA 94303-0728
Phone: (650) 752-0990 ext.100
Fax: (650) 752-0995

The Amended Claims

The following pages provide the amended claims with the amendments marked with deleted material in [brackets] and new material underlined to show the changes made.

1. (Once Amended) An integrated circuit comprising:

at least one metal layer comprising a plurality of sections, each section comprising [a plurality of] at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;

a first section comprising a first preferred direction for the conductors deposed in the first section; and

a second section comprising a preferred diagonal wiring direction for the conductors deposed in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section further comprising at least one conductor deposed in a Manhattan direction coupled to a conductor deposed in said preferred diagonal wiring direction.

3. (Once Amended) The integrated circuit as set forth in claim 2, wherein the first preferred diagonal direction comprises a direction perpendicular to said [a] preferred diagonal wiring direction in said second section.

7. (Once Amended) The integrated circuit as set forth in claim 6 [5], wherein:

the first diagonal direction comprises an octalinear direction; and

the second diagonal direction comprises an octalinear direction complementary to the first diagonal direction.

8. (Once Amended) The integrated circuit as set forth in claim 6 [5], wherein:

the first diagonal direction comprises a hexalinear direction; and

the second diagonal direction comprises a hexalinear direction complementary to the first diagonal direction.

9. (Once Amended) The integrated circuit as set forth in claim 6 [5], wherein:

the first diagonal direction comprises an octalinear direction; and

the second diagonal direction comprises a hexalinear direction.

14. (Once Amended) The integrated circuit as set forth in claim 13 [12], wherein:

the preferred direction comprises a diagonal direction; and

the direction different than the preferred direction comprises a Manhattan direction.

15. (Once Amended) The integrated circuit as set forth in claim 13 [12], wherein:

the preferred direction comprises a Manhattan direction; and

the direction different than the preferred direction comprises a diagonal direction.

16. (Once Amended) The integrated circuit as set forth in claim 13 [12], wherein the direction different than the preferred direction comprises a direction complementary to the preferred direction.